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AUTHOR Neimark, Edith D.
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ABSTRACT

In teaching people to think, a theory is needed about the thought process and about how it is modified by intervention. Most approaches to training people to think focus on an intermediary or mediating process. To explore the effectiveness of a group support training method in modifying cognitive style, the performance of female college student participants (N=29) was compared to that of controls (honors students, N=13, remedial writing students, N=5, and no training students, N=11) before and after the training course. The experimental group was divided into high and low ability groups and met once a week for 14 weeks of loosely structured exercises designed to explore the use of symbolism, promote abstract thinking and the generation of alternative viewpoints, broaden the application of thought, and promote metacognitive awareness. Experimentals and controls completed pre- and post-tests of the Watson-Glasser test of critical thinking, the Group Embedded Figures Test (GEFT), a water-bottle test correlating with the GEFT, and an essay evaluated for level of thinking and writing skill. At the conclusion of the semester, the control group showed a mean difference of 0.0 relative to their initial performance on the Watson-Glasser compared to the +1.68 mean difference for the experimentals. There was no evidence of improved academic performance for the experimental group as a result of the training in thinking. The findings suggest that the intervening training of the experimental group raised their level of critical thinking more than the intervening training (writing seminar, honors seminar, no systematic training) of the controls. (MCF)

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A Cognitive Style Change Approach to the Modification of Thinking in College Students

Edith D. Neimark

Rutgers--The State University

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Running Head: Cognitive Style Approach

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Author's Address: 319 Tillett, Kilmer Campus, Rutgers University, New Brunswick, NJ 08903.

Abstract

After a brief review of theoretical approaches to modification of thinking, a cognitive style modification approach is described. This approach assumes that age-appropriate competence is present but may not be translated into performance because of a non-facilatory style. Results of a taining program addressed at style modification through a group support method are reported. The training group improved on a criteria test of critical thinking relative to controls.

On Wanting to be a Thinker:
A Cognitive Style Change Approach to
the Modification of Thinking in College Students

This paper describes an experimental course offered to two groups of women at Douglass College in Fall, 1983, whose effectiveness was evaluated by means of before and after comparison with control counterparts. Since, in my opinion, the directing rationale of the program is of greater general significance than the procedures themselves it will be discussed in some detail by way of introduction.

Introduction and Background

The search for a framework. In teaching people to think, as in so many other enterprises, "if you want to get ahead, get a theory." Most serious workers in the area have taken that message to heart and the field has gone beyond the simplistic analyses and exhortatory self-improvement training procedures of the past (e.g., Adams, 1974; Albrecht, 1980; de Bono, 1967, 1970, 1980; Osborn, 1979, each of which offers some good insights and training heuristics). An insufficiency of the Karmiloff-Smith and Inhelder (1975) maxim for present purposes, however, lies in the article qualifying theory: "a" theory. I am not suggesting that "a" be replaced the "the": at this point there is no reason to doubt that several available alternative theories are worthy of further exploration. What I am suggesting is that we may need more than one of them: specifically, we need a theory about the nature of

the thought process, and we need a theory about how it is modified by intervention. The first provides guidelines on what we are studying, how to assess initial and final stages as well as steps along the way, and the setting of criteria for training programs. The second theory tells us how to modify the process in a desirable direction.

At first most people believed that understanding of the process, ipso facto, provided direction for how to change it. Thus, for example, people who fixed upon Piaget's theory of formal operations (Inhelder & Piaget, 1958, which is certainly an excellent choice as a theory of the process) trained students on formal operations tasks. It didn't work. Just as treating a disease by removing the symptoms produces no cure, so, too, does the reverse fail to apply: one cannot produce a disease by enstating all its symptoms. An alternative process description which focuses more narrowly upon problem solving (Newell & Simon, 1972) has also led to some good but "symptom-tied" training suggestions (Wickelgren, 1974).

At present most approaches to training people to think explicitly focus upon an intermediary, or mediating process. Here, too, there are several attractive candidates each with some respectable theoretical background. The instrumental enrichment approach of Feuerstein (1980) relies heavily on Vygotsky's (1978) notions of the zone of proximal development and the importance of

knowledgeable guidance. A second influential approach builds upon the concept of metacognition and teaches would-be thinkers to be aware and directive of their own thought processes (cf. Brown, Bransford, Ferrarra & Campione, 1983). A third approach, upon which the program to be described is based, modifies orientation and style features rather than the thought process itself. All of these approaches aim at extensive and generalizing changes in the individual's behavior, they involve more protracted training in which the role of an instructor is important, and they are much less content-tied than earlier training procedures. Some of the directing assumptions of the first two approaches will be described briefly before going on to a fuller description of the third.

The notion that an individual's ability is best described in terms of a zone whose lower bound is marked by the level of spontaneous performance and whose upper bound is marked by performance with the aid of a knowledgeable other was proposed by Vygotsky (1978) who suggested that systematic modeling and instruction by parents and teachers move the child upward in the zone. A similar notion underlies the Binet testing procedure of assessing mental age by establishing a lower bound where all items are passed, an upper bound where all are failed, and characterizing the child in terms of the sum of items passed within the range between those bounds. To take a statistical analogy, one describes ability in terms of a distribution which

has both a mean and a standard deviation; in principle, individuals can differ with respect to the form of the distribution, as well as its specific moments. Finally, it should be noted that although development is described as upward advancement of the zone, regression is also possible (and, perhaps, likely at later stages of life).

The concept of metacognition is widely used but loosely defined. It refers to an individual's awareness of and knowledge about his or her own thought processes, as well as the "executive" direction of them. It is generally assumed that the effective thinker is metacognitive in all senses of the term, and that becoming metacognitive is, therefore, a good thing. But, to the extent that the behavior in question exists before, and, often, independent of metacognitive awareness (as in Piaget's example of crawling on all fours) bringing it into consciousness must involve more than adding another ingredient. It must be the case that metacognitively directed behavior is different from the "mindless" behavior it supplants even though its topographical properties may be identical. Piaget (1976, 1978) offers some insightful discussions of these differences as do Lefebvre-Pinard and Pinard (1984). Their treatments differ from the information processing treatments of metacognition (e.g., Bransford, 1979) in giving the concept a more affective-motivational coloration.

A cognitive style approach. A third approach shares some features with the two just described but places more emphasis upon

motivation, affect, and personal values. For want of a better term I lump all those ingredients under the rubric of "cognitive style" although that term has some test-tied connotations which are too limited for my purposes. Style is to be distinguished from substance or underlying capacity much as performance is differentiated from competence. I assume a) style is more amenable to modification than is competence (intelligence) and that b) college students have the requisite competence for formal thought. Failure to deploy and strengthen available competence is the result of style-determined interferences (Neimark, 1981).

The next logical question is determination of the nature of cognitive styles. As a first step in that direction I looked for evidence concerning everyday thought in the average college student. There was none. To fill the void I began requiring my students to maintain a journal describing instances of thinking during the week. A collection of journals amassed over many years was analyzed (Neimark & Stead, 1981). The majority of the journals in the corpus were from women -- a shortcoming I hope to remedy in the future -- but, since all the recipients of the training program to be described but one were women, it posed no problem for that enterprise.

Analysis of the collected journals showed the average college woman's everyday thought to deal with commonplace events in a concrete and superficial manner. There were alarmingly few entries dealing with exploration of ideas and concepts (e.g., as

encountered in courses) or even current events. The few rare thinkers, by way of contrast, range widely, explore deeply (often returning to a problem later), generate alternatives, and search for an appropriate framework in which to place the problem. Everything is grist for their mill and the mill, itself, is in continuous operation. These data suggested to me that the average individual is very much context-timed: e.g., she deals with course material in class or in time periods set aside for study or preparation of assignments. Knowledge is compartmentalized and there is little crossing of compartment boundaries. There was also some explicit indication that many students preferred to conduct their mental lives this way as instanced by questions as to the value or purpose of thinking about things, or complaints about how hard, or tedious, it was to think about things. They prefer to do. That suggested to me that non-thinkers do not value thought nor view themselves as generators of it. Finally, I should add that the identifying characteristics I've been describing were stable over time and intercorrelated in ways leading to meaningful factors in a factor analysis. On these grounds it seemed amply justifiable to speak about cognitive styles.

The next question is whether styles are modifiable, and, if so, how? I had no trouble assuming that style is modifiable; existing evidence shows it. Modifiability is also suggested by the change in style over the course of development (which,

parenthetically, might also suggest viewing cognitive styles with respect to levels of maturity). How to produce changes is less clearly suggested by available evidence. Modeling seems to work well with children (Messer, 1976) and that would suggest a Feuerstein type of approach. I chose, instead, as my model, dealing with the breaking of such serious habits as overeating, drinking, smoking, gambling, drug abuse among people who become prey to their habits and lack the self-discipline to break them on their own. If habits of sloppy thinking (or none at all), which are also hard to break and quite possibly reflective of immaturity, are similar then a "nonthinker's anonymous" approach should work. The assumption was tested in Fall 1983 by offering a Douglass college course (i.e., under no departmental aegis) on a pass/fail basis. It met once a week and carried 1½ credits. The performance of participants before and after taking the course was to be compared to the performance of appropriate controls.

Method

Participants. Because formal experimental comparison of the course participants with appropriate controls was intended, the course was advertised among freshmen and sophomores during the spring before its offering, in order to get a preregistration list of participants. Fifty-three students signed up. During the summer information as to Scholastic Aptitude test scores, Grade point average, and High School was obtained for each preregistered participant and a control counterpart matched as closely as

possible with respect to those measures was selected for 50 of 53 intended participants. A letter was sent to each control so selected inviting her participation in before and after testing and offering to pay $10 for that service. The participants who had preregistered were assigned to one of two course sections of the basis of SAT and GPA scores.

In the fall 25 of the preregistered participants plus two additional participants (one from a different college) appeared. Of the 50 invited control counterparts only eleven appeared at the scheduled testing times. It was decided, therefore, to supplement the control group by addition of individuals who had enrolled for help at the writing center (n=5) and students in the Freshman honors program (n=13). The rationale for the selection of these two supplementary groups was that each was receiving special training designed to bring about improved performance. The thinking training ought to be at least as effective in raising scores on a test of critical thinking as was the less specifically directed training of the other two groups. At the end of the semester, only seven of the original control group and eight of the supplemental controls appeared for post-test.

The 27 students who appeared for the course in the fall were a heterogeneous group with grade point averages ranging from a low of 1.43 (academic probation) to a high of 4.0 (straight A average). Because of this heterogeneity, they were assigned to one of two ability level groups: low or high. Over the first

weeks, however, students moved among sections (they were free to do so) with the result that there were 9 members of the "low" group and 18 members of the "high." By the end of the fourteen week semester four students had dropped out of each group. Information on subject attrition for all groups is summarized in Table 1.

Insert Table 1 about here

Procedures. The research assessment component consisted in pre- and post-test with the Watson-Glaser test of critical thinking (form order counterbalanced), the Group Embedded Figures Test (Oltman, Raskin & Witkin, 1971); a water-bottle test which correlates with GEFT (Neimark & Gomez, 1978) and a required essay to be evaluated for writing skill and level of thinking reflected. The controls went on with their life or their own particular training program between pre- and post-test (weeks 1 and 14). The experimentals were assigned to one of two ability stratified groups (although they did not consistently observe the assignment) which met once a week under ground rules that only one absence was permitted. At each meeting the student should come with the assignment and be prepared to discuss it. Presumably in discussing what she did, what she found, and difficulties encountered students would learn from each other not only specifics, but also that she was not dumber (or smarter) than the others, that there are many possible views, that questions become

more complicated on deeper exploration, that there is rarely -- if ever -- just one right answer, etc. The subject matter in which assignments were embodied varied widely but in no case did it even resemble the items of the Watson-Glaser.

The course syllabus and some early assignments are given in the appendix. Since material was tailored to the group and to its progress it was not possible to adhere to the syllabus. Of greater relevance is the fact that there was no text. Although some assignments used the same library material for all students, for others students had to find their own examples from their reading and/or experience. For the most part, assignments were loosely structured as was weekly class discussion.

The guiding theme throughout the semester may best be summarized by the following principles: 1. Since thought is, by definition, a symbolic activity emphasis is placed upon expressing thought verbally, diagramatically, or in some other symbolic form. The effect of the form of expression was explored briefly. 2. To promote abstraction emphasis was placed upon detaching concepts from the context in which they were presented and the examples in which they were embodied. Students were to generate alternatives. 3. To detach thought from its personal focus students were given assignments to disregard their personal reactions and feelings and to take the viewpoint of another -- see the world through someone else's eyes -- and test the accuracy of their model. 4. To broaden the realm of application of thought beyond problem solving

and decision making there was deliberate deemphasis of material from these two realms. 5. To promote metacognitive awareness students were required to maintain a journal describing their thinking about preparation of weekly assignments.

Results

Because the number of individuals on whom there was complete data at the end of the experiment is very small and highly heterogeneous, it is useful to consider first the comparability of the experimental and control subjects. Data on initial comparability of the two groups are shown in Table 2. Comparison

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Insert Table 2 about here

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of overall means for Experimental and Control groups on each measure shows that the experimental group means are lower than the control groups for all measures. To the extent that the higher means for the control group results from inclusion of the Douglass scholars (who, being freshmen, have no cumulative grade point average yet) it was necessary to break each group into its component subgroups. With respect to SAT and grade point average the lower ability experimental subjects are clearly academically weaker than the other groups, who seem to be reasonably comparable to each other. With respect to cognitive style, the only measure of it in Table 2 is the score on the Group Embedded Figures Test (GEFT) which shows the low ability experimental and Writing Center

control subjects to be at the field dependent end of the continuum whereas the rest of their respective groups are much closer to the field independent end of the continuum.

At the conclusion of the semester, mean scores on the Watson-Glaser post test for the 15 control and 19 experimental participants remaining were 60.73 and 59.16 with standard deviations of 6.93 and 6.95 respectively. Relative to their initial performance there was a mean difference of 0.0 for the control group as compared to +1.68 for the experimentals. A test of the hypothesis that the true change mean is zero for each group yields a $Z = +1.61$ for the experimental group which is just short of the value ($Z = 1.64$) required at the .05 level for one tailed test. In view of the fact that none of the subjects received training directly relevant to the Watson-Glaser during the course of the semester, the results suggest that the intervening training for the experimental group did tend to raise the level of critical thinking more than the intervening training (writing center, honors seminar, or no systematic training) of the controls. Although the subgroup sizes are too small for meaningful comparison, it is noteworthy that every member of the lower ability experimental group improved, changing final scores from the 15-40th percentile to 35-64th percentile range.

One possible means of testing transfer of training to later course work is examination of cumulative grade-point average at the end of the academic year. The 16 experimental participants

for whom data were available showed a GPA increase of .04 points as compared with a mean increase of .10 for the 15 controls (Douglass Scholars excluded) for whom data were available. The mean increase for the experimentals is not statistically significant (Z = +1.09) whereas that of the controls is (Z = +3.15). The mean GPA change for the eight experimental participants who dropped out of the program, on the other hand, was -.01. Thus, so far as academic grades are concerned, there is no evidence of significantly improved performance in other courses as a result of training in thinking, but grades did not decline.

A final consideration has to do with student reactions to the course and its effect upon them. Virtually all students were uncomfortable with the loosely structured format; they wanted more structure and direction. Although there are no hard data to support it, impressionistically there seemed to be large differences in student satisfaction between the higher- and lower-ability experimental groups. There was resistance and constrained discussion in the higher ability group; their written assignments were reasonably well prepared but they never developed enthusiasm for discussing them. The low ability group, on the other hand, were much more accepting of the discussion format and less self conscious in their participation. Their contributions were of lower quality than those of the other group but there was also more evidence of growth. Participants appeared to discuss assignments and reactions to them outside of class, and, in class,

were more responsive to each other. They spontaneously reported greater self confidence about their academic work and new insights into their own thought processes. There are several possible explanations for these differences.

Discussion

The major dependent variable of the study, scores on a standardized test of critical thinking at the end of the semester, yielded suggestive evidence that course participants had improved more than did control students involved in more traditional instructional or remedial (writing center) training. There was, however, no evidence that the training was associated with a significant increase in cumulative grade point average at the end of the following semester. Given that students had thirteen sessions in a program the details of whose procedure could be improved upon, that is reasonably strong evidence of success -- especially in view of the small size and large variability of the groups compared.

If one accepts that the program did have the intended effect, why did it do so? We incline to interpret the evidence as support for a cognitive style change explanation on two grounds: student reaction and quality of change. With respect to the first, there seemed to be more student enthusiasm and satisfaction in the lower ability section. The aspects of change being addressed were what was needed: they had the sort of non-reflective style for which the program was designed and they seemed to respond to the means

of changing it. They appeared to like and profit from a social-support framework whereas the more successful students, who were already quite independent, neither needed nor wanted so much social interaction. The latter group already had a reasonably appropriate style and were trying to improve it; the program was not addressed to their needs. That the lower group were able to profit from such brief intervention in no way designed to remedy deficient thinking skills supports the assumption that they had the requisite competence but were hampered by a cognitive style nonconducive to translation of competence into academic performance.

There are, of course, possible alternative explanations of the findings which cannot be ruled out on the basis of the present evidence. One possible explanation concerns group size. One section was half the size of the other; a small group generally promotes more individual attention and opportunity/pressure for participation. A second possible explanation invokes mechanical, statistical, effects such as regression and adaptation level: i.e., it is easier to demonstrate change upward at the lower end of the continuum than at the upper. In view of all the intervention programs which have failed in spite of great time and effort, and in view of the usual fate of weak students without any intervention, that explanation is not as tenable as it might first appear to be.

The present evidence also provides some support for

Feuerstein's instrumental enrichment approach. Although firmly structured guidance may not be more effective in promoting change, students are happier with it and seek it. If this program is repeated in the future it will have a textbook and a more structured format for weekly sessions. As for evidence on the nature of metacognition and its role in developing critical thought, the present study has little to contribute.

References

Adams, J. L. (1974). Conceptual Blockbusting. San Francisco: Freeman.

Albrecht, K. (1980). Brain Power. Englewood Cliffs, NJ: Prentice-Hall.

Bransford, J. D. (1979). Human Cognition. Belmont, CA: Wadsworth.

Brown, A. L., Bransford, J. D., Ferrarra, R. A., & Campione, J. C. (1983). Learning, remembering, and understanding. In J. H. Flavell & E. M. Markman (Eds.), Handbook of Child Psychology, Vol. 3. New York: Wiley.

de Bono, E. (1967). New Think. New York: Avon.

de Bono, E. (1970). Lateral Thinking. New York: Harper & Row.

de Bono, E. (1980). Teaching Thinking. Middlesex, England: Penguin.

Feuerstein, R. (1980). Instrumental Enrichment. Baltimore: University Park Press.

Inhelder, B. & Piaget, J. (1958). The growth of logical thinking. New York: Basic Books.

Karmiloff-Smith, A., & Inhelder, B. (1975). If you want to get ahead get a theory. Cognition, 3, 195-212.

Lefebvre-Pinard, M., & Pinard, A. (in press). Taking charge of one's cognitive activity. In E. D. Neimark, R. De Lisi, & J. H. Newman (Eds.), Moderators of Competence. Hillsdale, NJ: Erlbaum.

Messer, S. F. (1976). Reflection-impulsivity: A review. Psychological Bulletin, 83, 1026-1053.

Neimark, E. D. (1981). Confounding with cognitive style factors: An artifact explanation. In I. Sigel, D. Brodzinsky, & R. Golinkoff (Eds.), New directions in Piagetian theory and practice. Hillsdale, NJ: Erlbaum.

Neimark, E. D., & Gomez, I. H. (1979). Correlates of water level representation in college students. Paper presented at the 50th annual meeting of Eastern Psychological Association: Philadelphia.

Neimark, E. D., & Stead, C. (1981). Everyday thinking by college women: Analysis of journal entries. Merrill-Palmer Quarterly, 27, 471-488.

Newell, A., & Simon, H. A. (1972). Human Problem Solving. Englewood Cliffs, NJ: Prentice-Hall.

Oltman, P. K., Raskin, E., & Witkin, H. A. (1971). The Group Embedded Figures Test, GEFT. Palo Alto, CA: Consulting Psychologists Press.

Osborn, A. F. (1979). Applied Imagination (3rd ed.). New York: Scribner.

Piaget, J. (1976). Grasp of Consciousness. Cambridge, MA: Harvard University Press.

Piaget, J. (1976). Success and Understanding. Cambridge, MA: Harvard University Press.

Vygotsky, L. A. (1978). Mind in Society. Cambridge, MA: Harvard University Press.

Wickelgren, W. (1974). How to solve problems. San Francisco: Freeman.

Table 1

Participant Attrition in Experimental and Control Groups from Initial Planning, S, to Start, F_a, and Completion, F_b, of the Study

		Time	
Group	S	F_a	F_b
Experimental	53	27	19
Control: match	50	11	7
supplement		18	8

Table 2

Means and Standard Deviations for Initial Measures on Experimental and Control Group Subjects

	Experimental			Control			
Measure	High	Low	Total	Honors	Match	Writing Center	Total
	N=18	N=9	N=27	N=13	N=11	N=5	N=29
SAT V	53.06(8.96)	41.56(6.84)	49.08	64.23(5.60)	49.91(6.61)	48.6 (14.74)	56.10
SAT Q	50.06(10.56)	41.88(5.04)	47.23	63.23(7.28)	51.45(6.31)	49.2 (9.91)	56.34
CUM. GPA 4.0 Max.	2.90(.688)	2.56(.531)	2.78	-----	2.84(.64)	3.11(.83)	2.92
WATSON-GLASER	59.5 (5.84)	52.67(3.46)	57.22	65.23(6.66)	53.18(17.31)	58.4 (10.64)	59.48
GEFT 18 Max.	12.28(4.30)	6.44(3.91)	10.33	12.77(4.28)	11.27(5.31)	6.8 (3.11)	11.17